

## Features and Benefits



Heavy Duty  
Control

CONTROL  
PRODUCTS

### Standard Features

Size 0–4 magnetic starters include the following standard features:

- Solid State Overload Standard On Sizes 3–8
- Rugged Industrial Design
- Half Sizes for Cost and Space Savings
- Dual Voltage, Dual Frequency Coils
- Solid State or Ambient Compensated Bimetal Overload Protection
- Front Removable Auxiliary Contacts
- Wide Range of Accessories
- Easy Coil Access
- Overload Test Feature
- Straight Thru Wiring
- Gravity Dropout
- Large Silver Cadmium Contacts

### Application

Heavy Duty starters are designed for across the line starting of single phase and polyphase motors.

These controls are available in NEMA Sizes 00 through 8. In addition to the usual NEMA Starter Sizes, Siemens & Furnas offers four exclusive Half Sizes; 1¾, 2½, 3½ and 4½. These integral sizes offer the same rugged, industrial construction as our NEMA Sizes and ensure efficient operating performance. Half Sizes provide a real cost savings by cutting down on over capacity when NEMA Sizes exceed the motor ratings. All Furnas Brand Heavy Duty controls, including our popular Half Sizes comply with applicable NEMA and UL tests.

All starters are supplied with a NO holding interlock that in conjunction with an appropriate pilot device will provide low voltage protection or release.

Furnas brand starters are ideal for applications requiring dependability and durability. Typical applications include use with machine tools, air conditioning equipment, material handling equipment, compressors, hoists and various production and industrial equipment as well as in demanding automotive applications.

Starters are available as an open type or in NEMA 1, 3, 4, 4X, 7 & 9, and 12 enclosures.

#### Gravity Dropout

For added reliability, the gravity dropout of the armature and contacts is assisted by stainless steel springs which help provide quick, precise opening of the contacts. Also provides straight through wiring.

#### 45 Degree, Wedge Action Contacts

The 45 degree, wedge action contacts reduce tracking and provide faster arc quenching. The resulting self-cleaning and reduced contact bounce mean cooler operation and longer life for the large silver cadmium oxide contacts.

#### Terminal Design

Control terminals are self rising pressure type.

#### Molded Coil

Magnetic coils are carefully wound and then sealed in epoxy. Encapsulation helps seal out moisture, promotes heat transfer and resists electrical, mechanical and thermal stresses.

#### Dual Voltage/Frequency Coil

Starters are available with dual voltage, dual frequency coils. They are designed to operate on either 50 or 60 Hertz.

#### Molded Stationary Contact Block

Thermoset materials resist arc tracking and the stresses of heat and severe impact.

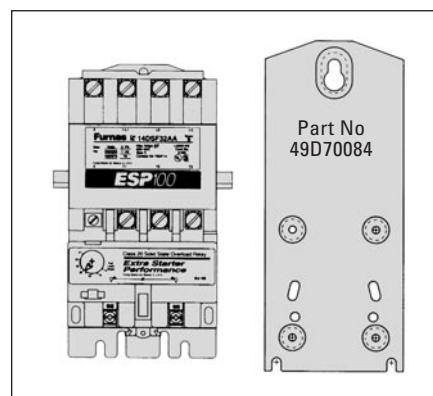
#### Field Modification Kits

All starters can be modified in the field with a complete range of accessories. These include pushbuttons, selector switches, pilot lights, auxiliary contacts and surge suppressors.

#### Auxiliary Equipment

- Furnas starters are available with built-in START-STOP push buttons for 3 wire control or a HAND-OFF-AUTO selector switch for 2 wire control.

- Field modifications such as auxiliary contacts, pilot lights, push buttons, selector switches, and fuse blocks are available to meet particular application requirements.
- Normally open or normally closed auxiliary power pole kits are available for Sizes 0 through 1¾.
- Transformers and pneumatic timers can be ordered as either factory or field modifications. In some cases these may require a larger enclosure.
- A full line of replacement parts are available including contact kits, coils, and overload relays.



Furnas Brand Sizes 00–1¾ have as standard, universal mounting which fits the following:

Cutler Hammer—Citation Series  
—Freedom Series

GE —300 Line

Square D —Type S

The Starter with its existing backplate mounts onto the piggyback mounting plate and is secured in place with three mounting screws. The piggyback mounting plate fits the following:

Allen-Bradley —Bulletin 509  
—Bulletin 709

Westinghouse —Series A200

#### Size 4½–8 Starters

##### Additional Features

- ESP100 Solid State Overload Standard Size 4½–8
- Control Power Transformer Standard Size 6–8
- Latest technology in arc quenching to extend contactor life
- Wide variety of enclosures in all starter configurations

Features and Benefits



Size 0–1¼  
ESP100 Solid State Starter

ESP100 starters combine the rugged characteristics of a NEMA rated contactor with a solid state overload which provides phase loss protection. It offers the industrial user greater protection and added life for motors in heavy duty applications. The inherent benefits of the ESP100 result in cost savings as well.

ESP100 Solid State Overload Relays

These standard features of the ESP100 provide Extra Starter Performance.

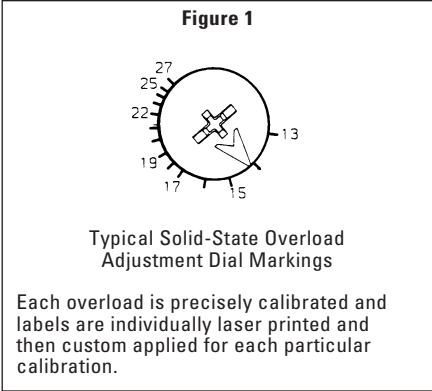
- True phase loss protection; trips within 3 seconds.
- High accuracy trip curves; ± 2% repeat trip accuracy.
- Ease of use. Mount, wire, and set FLA.
- Overload is self protected against short circuits.
- Overload is self powered and requires no hard wiring or separate power source.
- Heaterless construction minimizes energy costs and the costs of cabinet ventilation or cooling.
- Class 20 protection is standard. Class 10 and 30 protection are available.
- Provides motor protection for 50/60 Hertz.

Self-Reset Version

The self-reset starter is ideal for cranes, hoists, and other applications where the controls are mounted in a remote location that may be difficult to access. The NC overload contact opens for a short duration (50–75 msec) on an overload or phase loss condition. The unit provided can be applied in one of three ways:

1. Three wire control circuit using Furnas Size 0–4 contactor. The self-reset overload can be retrofitted and applied in a three wire control application as a remote reset overload without additional components or wiring.
2. PLC—(assuming initiating starter coil via PLC) Timers and counters can be used to determine time between restarts and maximum number of restarts.
3. Use NC overload contact to drop out a control relay. See page 475 for wiring diagrams.

ESP100 FLA Adjustment Dial—Set the adjustment dial on the overload to the FLA of the motor.



Half Size Starters

Furnas Brand Half-Size starters feature all the rugged performance characteristics of our NEMA rated starter sizes, but are fractionally sized to more closely match your exact motor rating. As a result, significant economic savings are made possible, without sacrificing the reliability you expect from a heavy duty starter.

These additional starter sizes have the reserve capacity to handle occasional plugging and jogging applications without derating. Superior operating performance in heavy duty applications is assured by the large current carrying parts, not by derating the device.

Exclusive “half-sizes” save potentially hundreds, even thousands of dollars per project.

Using the table below, simply match the specific size starter to the horsepower rating of your motor. Every half-size starter saves you money—up to 31%.

Furnas Brand “half-sizes,” comply to applicable NEMA and UL standards.

Savings for Furnas Brand “Half-Size” Starters in NEMA 1 Enclosures, FVNR

Motor Size		Starter Size	Half Size	Innova Price \$	Other Price \$	“Half-Size” Savings Over Next Full Size
230V	460V					
7½	10	1	—	246.	246.	—
10	15	—	1¼	336.	—	31%
15	25	2	—	486.	486.	—
20	30	—	2½	648.	—	20%
30	50	3	—	810.	810.	—
40	75	—	3½	1597.	—	13%
50	100	4	—	1830.	1830.	—
75	150	—	4½	3897.	—	10%
100	200	5	—	4317.	4317.	—

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### Enclosure Types

Combination starters are available in NEMA 1, 12, 3/3R, 4 (Painted), 4/4X (Stainless) and 7 & 9 enclosures. Enclosures protect personnel from contact with live parts and depending upon the construction, protect the control in varying degrees from physical damage and harmful atmospheres. All enclosures are supplied with corrosion resistant finishes.

### Enclosure Sizes

Furnas **standard enclosure** size is excellent for mounting on building columns or where zero clearance in side by side installations is important.

The **extra-wide** enclosure has ample space for mounting additional components.

The **horizontal compact** style is used in areas where vertical space is limited.

### Type MCS Disconnect Switches

New I-T-E Type MCS Disconnect Switches from Siemens go the distance in durability, performance and reliability. Quick make, quick break mechanism insure proper switch operation regardless of handle speed. Rugged construction—with a high fault withstand rating of 100kA at 600 volts AC when fused with class R rated size fuses—meets the most stringent industry standards set forth by the automotive, petro-chemical, and pulp and paper industries.

With visible blade contacts for ease of inspection, removable line shields and front removable fuse clips and lugs, I-T-E disconnect switches make day-to-day operation and maintenance quick and easy. UL recognized and CSA certified, they are available with class H, J and R fuse kits—for a wide range of fused, non-fused, and over-fusing options. Field installable auxiliary switches are also available.

### Siemens I-T-E Type ETI Circuit Breakers

The I-T-E type ETI circuit breaker introduced by I-T-E over 50 years ago and sometimes called a Motor Circuit Interrupter, is a device designed specifically for application in motor circuits. The ETI is a magnetic only protective device designed to provide protection against short circuit current.

The instantaneous-only type ETI circuit breaker employs adjustable magnetic trip settings to allow broader application ranges and a higher degree of motor short circuit protection.



### Heavy Duty Starters

These combination starters use the same heavy duty starters described in the preceding pages. ESP100 solid state starters and ambient compensated bimetal starters are available.

## Combination Starter Features

Sizes 0–4 combination starters include the following features:

- **Manufactured with NEW cold forming “tox” process.**
- ESP100 Starter Standard on Sizes 3–8
- Three Enclosure Sizes:
  - Standard
  - Extra Wide
  - Horizontal Compact
- Heavy Duty Quarter Turns
- 100kA Short Circuit Current Rating when Protected with Class R Fuses to 600V or MCP to 480V
- Visible Blade Disconnect
- Industrial Type Disconnect Handle

## Application

A combination starter meets National Electrical Code requirements for:

- 1.** A means of providing short circuit motor protection with fused or breaker disconnection of line voltage.
- 2.** A means of safeguarding personnel from contact with live parts and from accidental starting of machinery by disconnecting the motor and the controller.
- 3.** A motor controller with overload protection.

Prewired combination starters eliminate the cost of wiring between separate disconnect and starter. Factory testing assures field performance. Combination starters also provide a more compact and attractive installation than separate units.